

ASPHALT CONTENT BY IGNITION OVEN

INSTRUCTIONS TO PARTICIPANTS

A. Mix Ingredients

The mix, consisting of processed aggregates was used for a Saskatchewan Ministry of Highways and Infrastructure hot-mix paving project on Highway No. 6 south of Regina. The aggregates are from Saskatchewan Ministry of Highways and Infrastructure pit 72I-263, a glacial gravel deposit. Asphalt cement samples are from the same batch supplied by Moose Jaw Asphalt from Moose Jaw, Saskatchewan.

B. Sample Container

Your Ignition Oven mix exchange participant package consists of the following materials:

- 3 aggregate samples
- 3 asphalt mix samples
- 1 asphalt cement sample

The aggregate samples are to be used as follows:

- Three (3) 1,500.0 gram aggregate samples for the Ignition Oven calibration.
- Three (3) hot mix samples for the Ignition Oven testing.

C. Tests to be Performed and Reported

1. Calibration

Calibration testing is to be completed on the three 1,500.0 gram samples supplied for the Ignition Oven calibration.

The aggregate samples have been pre-weighed to 1,500.0 grams. The Ignition Oven calibration testing is to be completed at an asphalt content of **5.7%** based on the dry weight of aggregate (5.39% asphalt content based on a total mix basis).

Three samples are to be prepared separately by adding 85.5 grams of asphalt to the aggregate in order to obtain the desired asphalt content of 5.7% based on the dry weight of the aggregate.

Three determinations will be made to establish a calibration factor.

Note:

- **If for some reason the aggregate mass varies from that specified, the asphalt cement mass should be calculated based on the new aggregate mass to achieve an asphalt cement content of 5.7% by weight of dry aggregate.**

Mixing

1. Aggregates shall be heated for 12 hours minimum at a temperature of 110°C \pm 5°C prior to adding asphalt.
2. Mixing should be done at 145°C using a "**battered**" mixing pan. The mixing pan should not be totally clean but should contain the residue from previous mixing that is left after scraping with a spoon and/or spatula.
3. The asphalt cement added should be the percentage specified and no allowance should be made for asphalt cement that is left sticking to the sides

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of the mixing pan.

4. All mixing is to be done by hand using a spoon and a spatula.
5. After the sample is mixed, record the mass of the total mixture to the nearest 0.1 gram as M_{PC1} .
6. Repeat the process for the other two samples and record the mass of the total mixture to the nearest 0.1 gram as M_{PC2} and M_{PC3} .

Testing

7. After the samples are prepared, the asphalt content should be determined using:

ASTM D6307 Standard Test Method for Asphalt Content of Hot-Mix Asphalt by Ignition Method.

8. After the asphalt is burned off in the ignition oven, determine the mass of the remaining sample to the nearest 0.1 gram and record it as M_{AC1} , M_{AC2} and M_{AC3} .

Note:

- **Ensure that the mass recorded as M_{AC1} , M_{AC2} and M_{AC3} are from the same samples as the masses recorded for M_{PC1} , M_{PC2} and M_{PC3} respectively.**

Calculations

1. Calculate the measured percent mass loss (C_{Sx}) for each sample using the equation in ASTM D 6307:

$$C_{Sx} = \left(\frac{M_{PCx} - M_{ACx}}{M_{PCx}} \times 100 \right) - \% AC$$

C_{Sx} = Measured mass loss of the calibration sample

x = Calibration sample number, where x = 1 or x = 2 or x = 3.

M_{PCx} = Total mass of the mixture calibration sample prior to ignition.

M_{ACx} = Total mass of the mixture calibration sample after ignition.

$\%AC$ = Percentage of the actual asphalt cement in the mix by **mass of the total mix** expressed as a percentage (e.g. 5%).

2. Record the measured mass loss of the calibration sample for each sample on the test result sheet, in the "Data Collection and Submission Forms" section of these instructions.
3. Calculate the average calibration factor (C_F) using the following equation:

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$$C_F = \frac{C_{S1} + C_{S2} + C_{S3}}{3}$$

Where:

C_F = Average measured mass loss of the calibration samples expressed as a percentage

C_{S1} = Measured mass loss of calibration sample 1

C_{S2} = Measured mass loss of calibration sample 2

C_{S3} = Measured mass loss of calibration sample 3

4. Compute and record the average calibration factor on the test result sheet in the "Data Collection and Submission Forms" section of these instructions.

2. Testing of premixed samples

Ignition oven testing is to be completed on the three hot mix samples supplied for the Ignition Oven testing.

The asphalt mix samples have been pre-mixed with a predetermined amount of asphalt that is known only to the co-ordinating agency.

Three determinations are to be made for testing purposes.

Preparation of asphalt mix samples

1. In accordance with AASHTO T308 or ASTM D6307, oven dry each hot mix sample at a temperature of $105^{\circ}\text{C} \pm 5^{\circ}\text{C}$ to constant mass.
2. Record the mass of the total mixture to the nearest 0.1 gram as M_{PT1} .
3. Ensure the sample has been softened enough to distribute evenly in the sample basket.
4. Repeat the process for the other two samples and record the mass of the total mixture to the nearest 0.1 gram as of the total mixture to the nearest 0.1 gram as M_{PT2} and M_{PT3} .

Testing

1. After the samples are prepared, the asphalt content should be determined using AASHTO T308 or ASTM D6307.
2. After the asphalt is burned off in the ignition oven, determine the mass of the remaining sample to the nearest 0.1 gram and record it as M_{AT1} , M_{AT2} and M_{AT3} .

Note:

- Ensure that the mass recorded as M_{AT1} , M_{AT2} and M_{AT3} are from the same samples as the masses recorded for M_{PT1} , M_{PT2} and M_{PT3} respectively.

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Calculations

1. Calculate the corrected asphalt content (%AC_x) using the equation in ASTM D 6307:

$$\% AC_x = \left(\frac{M_{PTX} - M_{ATX}}{M_{PTX}} \times 100 \right) - C_F$$

Where:

%AC_x = Measured percent asphalt content by **mass of the oven-dry HMA sample**.

C_F = Calibration factor determined above, expressed as a percentage.

x = Testing sample number, where x = 1 or x = 2 or x = 3.

M_{PTX} = Total mass of the mixture testing sample prior to ignition.

M_{ATX} = Total mass of the aggregate remaining after ignition.

2. Calculate the asphalt content percent (%AC) by mass of the oven dry HMA for each sample and the average asphalt content by mass of the oven dry HMA samples and record on the test result sheet in the "Data Collection and Submission Forms" section of these instructions. This is the value that will be shown in the report.
3. For information purposes compute the asphalt content percent (%AC) **by dry weight of aggregate** for each sample and the average asphalt content **by dry weight of aggregate** and record on the test result sheet in the "Data Collection and Submission Forms" section of these instructions. Use the following formula for calculating (%AC) **by dry weight of aggregate**:

$$\% AC_{\text{DRY WEIGHT AGGREGATE}} = \frac{\% AC_{\text{OVEN DRY}}}{1 - \left(\frac{\% AC_{\text{OVEN DRY}}}{100} \right)}$$

Other Data

1. Please report the following information regarding your Ignition Oven:
 - Ignition Oven Manufacturer
 - Model Number
 - Internal Weighing System (Yes or No)
 - Automatic Data Collection System (Yes or No)
 - Number of Load Cells

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D. Submission of Data

Submission Date

All data shall be returned by **March 28, 2008**.

Please **submit completed test results sheet and direct all questions to:**

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DATA COLLECTION AND SUBMISSION FORMS

2008 Canadian Asphalt Mix Exchange Program Data					
Lab Name:					
Ignition Oven Correlation Sample					
Sample Number	M_{PC}	M_{AC}		C_S	
1					
2					
3					
		C_F			
Ignition Oven Test Data					
Sample Number	M_{PT}	M_A T	%AC		
			<small>By Mass of Oven-Dry HMA</small>	<small>By Dry Weight of Aggregate</small>	
1					
2					
3					
		Average %AC =			
Other Ignition Oven Data					
Manufacturer:					
Model Number:					
Automatic Weighing System:		Ye s	No	Number of Load Cells:	
Automatic Data Collection System:		Ye s	No		